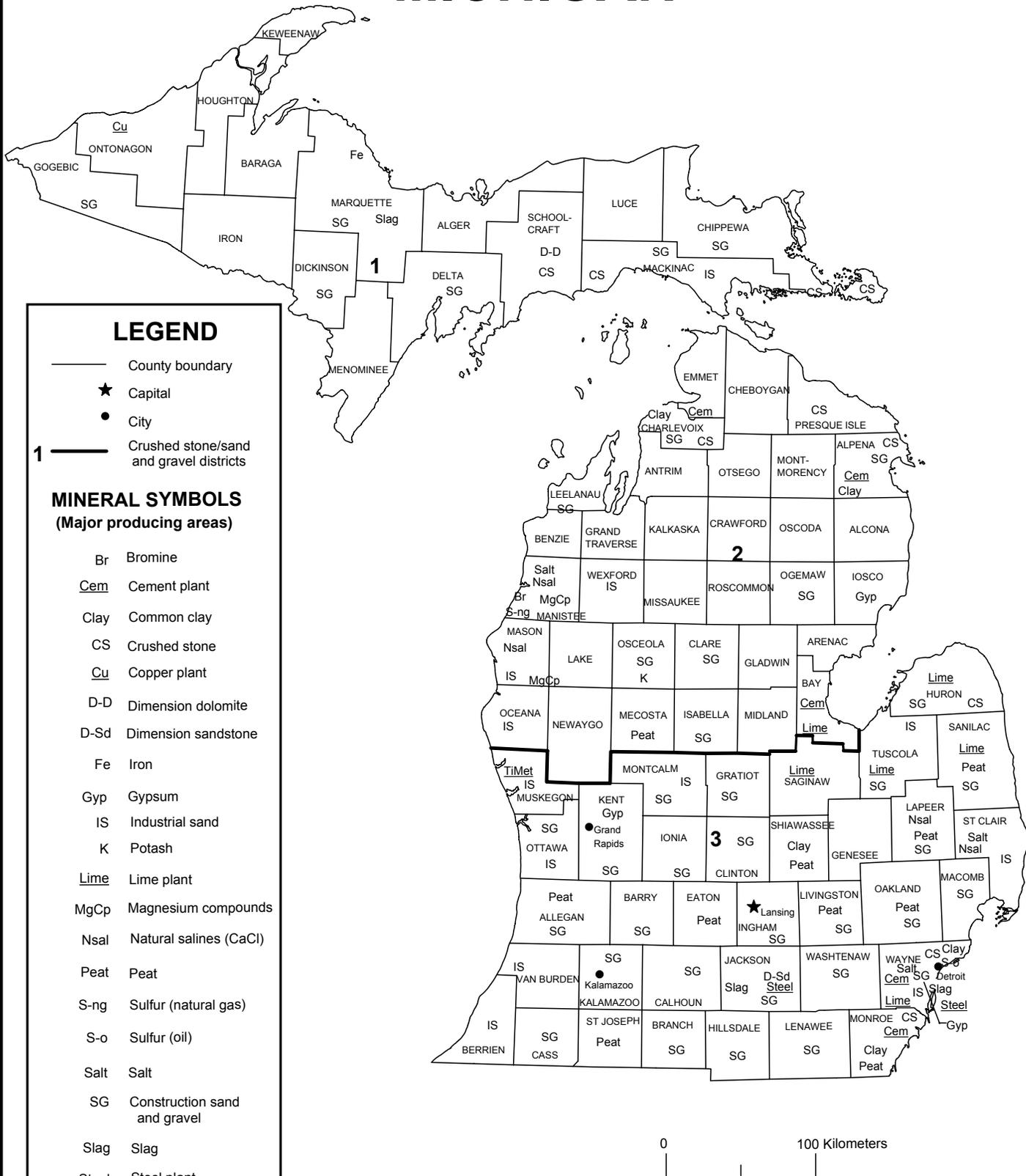


MICHIGAN



LEGEND

- County boundary
- ★ Capital
- City
- 1 — Crushed stone/sand and gravel districts

MINERAL SYMBOLS (Major producing areas)

- Br Bromine
- Cem Cement plant
- Clay Common clay
- CS Crushed stone
- Cu Copper plant
- D-D Dimension dolomite
- D-Sd Dimension sandstone
- Fe Iron
- Gyp Gypsum
- IS Industrial sand
- K Potash
- Lime Lime plant
- MgCp Magnesium compounds
- Nsal Natural salines (CaCl)
- Peat Peat
- S-ng Sulfur (natural gas)
- S-o Sulfur (oil)
- Salt Salt
- SG Construction sand and gravel
- Slag Slag
- Steel Steel plant
- TiMet Titanium metal plant



THE MINERAL INDUSTRY OF MICHIGAN

This chapter has been prepared under a Memorandum of Understanding between the U.S. Geological Survey and the Michigan Department of Environmental Quality, Geological Survey Division, for collecting information on all nonfuel minerals.

In 2002, the estimated value¹ of nonfuel mineral production for Michigan was \$1.58 billion, based upon preliminary U.S. Geological Survey (USGS) data. This was about a 3% decrease from that of 2001² and followed a marginal decrease in 2001 from 2000. The State continued, for the third consecutive year, as sixth in rank among the 50 States in total nonfuel mineral production value, of which Michigan accounted for more than 4% of the U.S. total.

Michigan continued to be the Nation's second leading iron-ore-producing State in 2002. Although iron ore production represented a very significant percentage of the State's nonfuel mineral economy, portland cement (for the fourth consecutive year) was Michigan's leading nonfuel mineral commodity, followed by iron ore, construction sand and gravel, and crushed stone. The two leading commodities accounted for approximately 51% of the State's nonfuel raw mineral production value; construction sand and gravel and crushed stone accounted for another 27% of the State's total value; and the State's next two nonfuel minerals, salt and magnesium compounds, made up about 14% of the State's total value. In total, these six nonfuel mineral commodities accounted for about 92% of Michigan's total nonfuel raw mineral value (table 1). In 2002, the State's decrease in value came mostly as a result of a nearly \$50 million drop in magnesium compounds and a combined total decrease of about \$25 million for portland cement, salt, and iron ore.

In 2001, decreases of about \$24 million in iron ore, about \$9 million in gypsum, \$3 million each in construction sand and gravel and lime, and between \$1 million and \$1.5 million each in bromine, common clays, peat, and potash more than offset increases of \$12 million in crushed stone, about \$7 million in magnesium compounds, \$6 million in cement, and about \$2 million each in industrial sand and gravel and salt, resulting in the small net loss for the year (table 1).

Compared with USGS estimates of the quantities produced in the other 49 States in 2002, Michigan remained first in magnesium compounds; second in iron ore, industrial sand and gravel, and peat, as well as second of 2 bromine-producing States; third in construction sand and gravel and third of 3 States that produce potash; fourth in portland cement; and eighth in masonry cement. The State rose to sixth from eighth in the production of gypsum, decreased to seventh from sixth in salt, and was a significant producer of crushed stone, lime, and common clays (listed in descending order of value). Michigan remained third in the Nation in the manufacture of raw steel with an output of 6.22 million metric tons (Mt) (American Iron and Steel Institute, 2002, p. 76).

The following narrative information was provided by the Michigan Department of Environmental Quality (MDEQ), Geological and Land Management Division, and the Michigan Department of Natural Resources (MDNR), Forestry, Mineral, and Fire Management Division.³

Exploration and Lease Activity

Platinum-group-metal exploration continued in Baraga County where Yooper Exploration Services, Inc. found low values of palladium in outcrop hand samples on State land (Skillings Mining Review, 2002a).

The MDNR manages leasing of State-owned lands for the exploration and development of metallic and nonmetallic minerals, oil and gas, and underground gas storage. Most of the lease and royalty revenues go to the Michigan Natural Resources Trust Fund (MNRTF), which is used to purchase and maintain public recreation lands and facilities. Private companies are allowed to lease land in order to produce minerals. In some cases, the companies are only involved in exploration and development, and, in other cases, they may be mining a deposit.

All metallic mineral leases were in the exploration phase—none were in the production phase. There were 112 leases in effect, covering 9,667 hectares (ha). Six applications for leases, involving 11,100 ha were reviewed for possible leasing in fiscal year 2003. The total income from rental, bonus, and nomination and assignment fees totaled \$649,934. Three firms submitted exploration plans

¹The terms "nonfuel mineral production" and related "values" encompass variations in meaning, depending upon the minerals or mineral products. Production may be measured by mine shipments, mineral commodity sales, or marketable production (including consumption by producers) as is applicable to the individual mineral commodity.

All 2002 USGS mineral production data published in this chapter are preliminary estimates as of July 2003 and are expected to change. For some mineral commodities, such as construction sand and gravel, crushed stone, and portland cement, estimates are updated periodically. To obtain the most current information, please contact the appropriate USGS mineral commodity specialist. Specialist contact information may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals/contacts/comdir.html>; alternatively, specialists' names and telephone numbers may be obtained by calling USGS information at (703) 648-4000 or by calling the USGS Earth Science Information Center at 1-888-ASK-USGS (275-8747). All Mineral Industry Surveys—mineral commodity, State, and country—also may be retrieved over the Internet at URL <http://minerals.usgs.gov/minerals>.

²Values, percentage calculations, and rankings for 2001 may differ from the Minerals Yearbook, Area Reports: Domestic 2001, Volume II, owing to the revision of preliminary 2001 to final 2001 data. Data for 2002 are preliminary and are expected to change; related rankings may also change.

³The text of the State mineral industry information was compiled and edited by Milton A. Gere, Jr., Geologist and Supervisor, Metallic and Nonmetallic Minerals and Underground Gas Storage Leasing Unit, Minerals and Land Management Section, Forestry, Mineral, and Fire Management Division, Michigan Department of Natural Resources, and Steven E. Wilson, Geologist and Supervisor, Minerals and Mapping Unit, Geological Services Section, Geological and Land Management Division, Michigan Department of Environmental Quality.

or requested time extensions of existing plans. The DEQ reported that two companies drilled 64 exploration drill holes in three counties.

Ten 2002 nonmetallic mineral leases were ready to mine or in the production phase and included 486 ha. Besides the general nonmetallic minerals lease, there were specific leases for construction sand, gravel, cobbles, boulders and clay, limestone-dolomite, and salt. The nonmetallic minerals royalty income was \$1,105,898; the income from permit activities was \$227,620; the income from rental activities was \$2,236; and all three incomes totaled \$1,335,754.

Commodity Review

Michigan has long been an important State in mineral production. The minerals industry was a busy in 2002 and was expected to remain so in 2003. Mineral production and exploration takes place on private, State, and federally owned lands.

Industrial Minerals

Crushed Stone.—Michigan Limestone Operations Inc. (a subsidiary of Oglebay Norton Co.) operated three limestone-dolomite quarries in Michigan. Port Inland, formerly owned by Inland Steel Co., near Gulliver in the Upper Peninsula, produced 4.5 to 5.4 Mt in 2002. Port Calcite, near Rogers City in the Lower Peninsula, produced 6.4 to 9.5 Mt, and Port Dolomite, near Cedarville in the Upper Peninsula, produced 2.7 to 3.6 Mt. Both Port Calcite and Port Dolomite were formerly owned by U.S. Steel Corp. The quarries produced a variety of limestone and dolomite products for many uses.

Gypsum.—U.S. Gypsum Co. celebrated 100 years of operation in 2002. It operated gypsum quarries, wallboard plants, and other facilities in many locations. U.S. Gypsum has operated the Alabaster Quarry at Alabaster, MI, for many of its 100 years.

Sand and Gravel.—Land developers in Oakland County and surrounding areas converted old sand and gravel pits to high-end housing subdivisions. Varied surface topography and some large ponds add to the interest in these sites.

Kent County had a number of sand and gravel related concerns in 2002. Caledonia Township Planning Commission members tabled a request to rezone 16 ha to allow sand mining for up to 10 years; a 1988 rezoning request had been denied to allow mining of the same site. The developers were given a list of conditions to meet for reconsideration of their requests. The planning commission also considered increasing the required distance between a sand and gravel mine and a residence from 30 meters (m) to 150 m. A distance of 300 m was considered as being unreasonable by some of the commission members. Presently, an operation can mine up to 9 m from the property line if the adjoining resident agrees. The commission also considered allowing an increase in mining site size to 3 ha for mining with 3 ha being prepared for mining while restoring another 3 ha. This is up from the 2 ha in each category currently allowed. Additional discussion and public ordinance hearings will be needed before any changes are made.

Gaines Township officials rescheduled a hearing to allow a sand and gravel company to store materials on the production site, after the completion of mining, for a longer time than had been permitted to mine and reclaim the site. The company said that slower sales were the reason that the pit could not be mined out and reclaimed by 2003 as had been permitted.

A gravel company executive testified in a \$5.5 million lawsuit against Cascade Township that a 1999 request to rezone to allow a permit to mine gravel was denied because of pressure on the planning commission by area residents. Now highway work nearby will prevent 1.5 million cubic meters of material from ever being mined. In 2000, the township had considered the mining request to make the highway safer by removing the hill involved in the mining request, but voted not to settle the suit because of objections from residents.

Plans for a large Grand Rapids area park project were announced. It would include 40 ha of an area that had previously been mined for sand and gravel and formerly had been the site of several oil wells. The property would be converted to a large pond/lake system and contain picnic locations and hiking trails as well as fishing sites. Many sources of funding were suggested to develop the recreation site.

The State Court of Appeals banned a company from expanding its sand mining operations into 29 ha of a nearby critical dune area in Berrien County. The company's request to mine was turned down by the Department of Natural Resources (DNR) in 1994, but it was approved to mine in 1996 by the Department of Environmental Quality (DEQ) after the 1995 split of the DNR into the DNR and DEQ. The court said that the company did not qualify for the exception to the ban on mining within the critical sand dune area.

Metals

Iron Ore.—In early January, Cleveland-Cliffs Inc., which operated Michigan's two large open pit iron ore mines, announced several actions to conserve cash and improve financial results. The Tilden Mine was to operate near the Complex's 7.9-Mt design capacity. At that time, the Empire Mine was idle pending a production decision by the two remaining owners, Ispat International N.V. (21% equity) and Cliffs (79% equity as of 12/31/02) (Cleveland-Cliffs Inc., 2002a§⁴).

Shipments of iron ore from the Lake Superior region in 2002 totaled about 51.4 Mt. Michigan's shipments amounted to about 12 Mt of this total.

⁴References that include a section mark (§) are found in the Internet References Cited section.

Michigan's U.S. Senators stated that the U.S. steel tariffs announced in early March 2002 did not do enough to protect Michigan's iron-ore-mining and steelmaking jobs. At the same time, industries using imported steel faced higher prices, which may force some closings and job reductions in that sector of the economy.

On March 7, Cleveland-Cliffs Inc. announced that it would reopen the Empire Mine by the end of the month, raising the hopes of idled workers (Skillings Mining Review, 2002b). The mine produced about 3.7 Mt of iron pellets during the year and was scheduled to produce about 6.3 Mt in 2003. About 360 employees were expected to return to work. The mine had been idle since November 2001 when former 25% owner, LTV Corp., stopped integrated steelmaking operations. A late March news item said that the Empire Mine would not resume production until April 12. Water lines used in the operations had been drained during the shutdown to prevent freezing and had to be refilled. Snow also had to be removed from parts of the mine pit. About 140 workers shifted to the Tilden Mine when the Empire Mine closed were to remain working at the Tilden Mine. At yearend 2002, the Empire Mine had 679 employees; Tilden, 804, including some employees still on layoff status (Cleveland-Cliffs Inc. 2003, p. 43).

Michigan's Senate considered lowering the tax on mined low-grade iron ore by about 32% to aid the depressed Michigan iron ore industry. The Senate hoped to keep Michigan's last two iron ore mines operating.

On April 12, 2002, Cleveland-Cliffs Inc. announced a 15-year agreement to be the sole supplier of iron ore pellets to International Steel Group Inc., which had acquired the main steelmaking and finishing assets of LTV Steel Corp.

Tilden Mine produced its 150 millionth ton of iron ore pellets in August 2002. The Tilden opened in 1974 and has accounted for more than one-third of the iron ore pellets produced on Michigan's Marquette Iron Range since pelletizing started there in 1956. On January 31, 2002, Cliffs acquired the 45% interest in Tilden held by Algoma Steel, Inc. of Canada. Tilden Mining Co. LLC is now owned 85% by Cleveland-Cliffs Iron Co. and 15% by Stelco Inc.

Cleveland-Cliffs 2002 third quarter report stated that the Empire Mine had no production during the first quarter of the year. Cliffs' share of Michigan's 2002 output was significantly higher than that of 2001 because of the Algoma buyout and the higher production level at Tilden in 2002 (Cleveland-Cliffs Inc., 2002b§). Cleveland-Cliffs announced that it was considering the merger of the Empire and Tilden Mines.

A cost comparison study of North American iron ore mines included a ranking of the mines by cost per long ton delivered to the lower Great Lakes markets, with Tier 1 being the lowest and Tier 3 the highest for North America. Tilden Mine pellets were ranked in Tier 2 in the \$36.76 to \$39.66 category, while Empire Mine pellets were ranked in Tier 3 in the \$40.01 to \$42.04 category. Higher priced offshore pellets fell into the Tier 4 category of more than \$49 per ton (Kakela, 2002).

Government Programs

The U.S. Minerals Management Service announced in 2002 that, in 2001, it distributed revenues from mineral leases on Federal lands to 33 States. Michigan's reported share was \$472,993.79. This money was derived from the State's share of bonuses, rents, and royalties collected from projects on Federal lands within Michigan.

The State of Michigan acquired about 1,200 ha of Keweenaw Peninsula land in the Upper Peninsula from a large land-owning company in 2002. About 1,200 more hectares may be obtained in 2003. MNRTF grants were obtained to pay the \$12.5 million cost of the property. The Nature Conservancy aided in the purchase transaction. The MNRTF receives bonus, rental, and royalty monies collected on leases for oil-and-gas and metallic and nonmetallic mineral leases on State-owned lands in Michigan. The lands were obtained by the State through the tax reversion process. State and local governments may request MNRTF grants for the purchase and development of public recreational lands.

The Seaman Mineral Museum at Michigan Technological University (MTU) announced the hiring of a design firm for the proposed new museum facility. Plans to move the museum from the MTU campus across Portage Lake to the Quincy Mine location have been discussed for several years. Initial plans call for the present 460-square-meter museum to be moved into a 2,000-square-meter space yet to be developed. Funding to hire the design firm came through the Institute of Museum and Library Services from a federal appropriation. The firm planned to have the design completed by the end of 2002. The Museum was expected to raise \$16 million by 2005 to fund the building.

Michigan Aggregates Association (MAA) received a safety and training grant from the Michigan Department of Consumer and Industry Services. MAA will use the grant to provide program assistance in noise sampling and hearing conservation to aggregate producers in the State. This is added to the safety training services that MAA provides aggregate producers to meet requirements of the U.S. Mine Safety and Health Administration.

A historical marker honoring Douglass Houghton, Michigan's first State Geologist, and recognizing State Salt Well No. 1 was dedicated in Sanford, MI, on September 7, 2002. The marker commemorates the first attempt to drill for salt in Michigan in 1838—1 year after Michigan became a State.

A special short-term permit was issued by the Department of Natural Resources to Mr. Shawn Carlson and partners to perform a mineral specimen recovery and inventory project at the State-owned Indiana Mine property in Ontonagon County. The rock piles at the abandoned copper mine property were searched, specimens recovered, a report evaluating specimen mining on the location was submitted, and a royalty was paid to the State. A number of interesting copper and associated mineral specimens were recovered and offered for sale to the mineral collector market.

Abandoned mines were made safer at a number of locations. The Michigan DNR contracted for fencing, mine capping, and related safety features at a number of State-owned abandoned mine properties again in 2002.

An area in Grand Rapids, MI, overlying an old gypsum mine and gravel pit, was proposed as the site on which to expand the Kent County-owned John Ball Zoo. A detailed mine stability study by mining experts recommended against building over the location

because of potential subsidence problems. Mine pillars may dissolve and fail owing to flooded abandoned mine conditions. Some sinkholes have already appeared on the surface. An expensive alternative would be to fill the old mine with cement to keep it from subsiding. In a related story, the mayor of the City of Grand Rapids asked the city engineers to review the study. The mayor wanted the current zoo to expand into the old mine area instead of moving the cramped zoo outside of the city.

Michigan is the home to many bats that live or hibernate in abandoned or idle underground iron and copper mines. Bat Conservation International (BCI), U.S. Natural Resources Conservation Services, MDNR, and Lake Superior Land Co. placed bat gates, or cages, on the Copper Falls Mine. In prior years, additional Michigan mines had bat gates installed by several agencies in the group. MDNR's Wildlife Division and BCI hosted the first Great Lakes Bat Festival, which was held in Iron Mountain, MI, in August 2002. Bat experts gave presentations and public programs on bats throughout the weekend program.

References Cited

- American Iron and Steel Institute, 2002, Washington, DC, Annual statistical report 2002: American Iron and Steel Institute, 130 p.
- Cleveland-Cliffs, Inc., 2003, Annual report—2002: Cleveland, OH, Cleveland-Cliffs, Inc., 47 p.
- Kakela, P.J., 2002, Cost comparison for North American iron ore mines, part 1: *Skillings Mining Review*, v. 91, no. 20, November 2, p. 12-14.
- Skillings Mining Review*, 2002a, PGE work continues in Baraga County, Michigan: *Skillings Mining Review*, v. 91, no. 12, June 22, p. 15.
- Skillings Mining Review*, 2002b, Empire iron mine to resume operation in late March: *Skillings Mining Review*, v. 91, no. 6, March 23, p. 18.

Internet References Cited

- Cleveland-Cliffs Inc., 2002a (January 8), Cleveland-Cliffs taking actions to address current economic environment, Press Release, accessed November 13, 2003, at URL <http://www.cleveland-cliffs.com/MediaPressRoom/>.
- Cleveland-Cliffs Inc., 2002b (October 23), Cleveland-Cliffs reports third quarter 2002 results, Press Release, accessed November 13, 2003, at URL <http://www.cleveland-cliffs.com/MediaPressRoom/>.

TABLE 1
NONFUEL RAW MINERAL PRODUCTION IN MICHIGAN^{1,2}

(Thousand metric tons and thousand dollars)

Mineral	2000		2001		2002 ^p	
	Quantity	Value	Quantity	Value	Quantity	Value
Cement:						
Masonry	296	28,900 ^e	290	28,900 ^e	280 ^e	28,000 ^e
Portland	5,790	450,000 ^e	5,920	456,000 ^e	W	W
Clays, common	594	3,210	595	2,280	611	2,280
Gemstones	NA	1	NA	1	NA	1
Gypsum, crude	1,980	19,800	929	10,600	966	10,700
Peat	207	5,750	208	4,750	197	4,250
Sand and gravel:						
Construction	75,600	269,000	76,300	266,000	76,100	271,000
Industrial	2,520	27,800	2,530	30,000	2,530	30,000
Stone, crushed	42,200 ³	148,000 ³	43,200 ³	160,000 ³	40,800	154,000
Combined values of bromine, iron ore (usable), iron oxide pigments (crude), lime, magnesium compounds, potash, salt, stone [crushed marl and miscellaneous (2000-2001), dimension dolomite and sandstone], and value indicated by symbol W	XX	691,000	XX	669,000	XX	1,080,000
Total	XX	1,640,000	XX	1,630,000	XX	1,580,000

^eEstimated. ^pPreliminary. W Withheld to avoid disclosing company proprietary data; value included with "Combined values" data. XX Not applicable.

¹Production as measured by mine shipments, sales, or marketable production (including consumption by producers).

²Data are rounded to no more than three significant digits; may not add to totals shown.

³Excludes certain stones; kind and value included with "Combined values" data.

TABLE 2
MICHIGAN: CRUSHED STONE SOLD OR USED, BY KIND¹

Kind	2000				2001			
	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value	Number of quarries	Quantity (thousand metric tons)	Value (thousands)	Unit value
Limestone	22 ^r	33,500 ^r	\$113,000 ^r	\$3.38 ^r	22	35,100	\$129,000	\$3.67
Dolomite	6 ^r	8,730 ^r	35,200 ^r	4.04 ^r	6	8,110	31,300	3.86
Calcareous marl	1	W	W	3.53	1	W	W	3.58
Sandstone	1	12	195	16.25	1	9	153	17.00
Miscellaneous stone	1	W	W	3.31	1	W	W	3.36
Total or average	XX	42,200	148,000	3.52	XX	43,200	160,000	3.71

^rRevised. W Withheld to avoid disclosing company proprietary data; included in "Total." XX Not applicable.

¹Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

TABLE 3
MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2001, BY USE¹

Use	Quantity (thousand metric tons)	Value (thousands)	Unit value
Construction:			
Coarse aggregate (+1 1/2 inch):			
Riprap and jetty stone	139	\$1,630	\$11.71
Filter stone	W	W	7.19
Other coarse aggregates	100	608	6.08
Coarse aggregate, graded:			
Concrete aggregate, coarse	3,130	13,600	4.33
Bituminous aggregate, coarse	636	2,990	4.70
Bituminous surface-treatment aggregate	W	W	7.65
Railroad ballast	W	W	6.65
Other graded coarse aggregates	2,510	10,400	4.15
Fine aggregate (-3/8 inch):			
Stone sand, concrete	W	W	3.58
Stone sand, bituminous mix or seal	101	440	4.36
Screening, undesignated	221	810	3.67
Other fine aggregates	32	114	3.56
Coarse and fine aggregates:			
Graded road base or subbase	1,190	5,640	4.73
Unpaved road surfacing	114	516	4.53
Crusher run or fill or waste	24	212	8.83
Other coarse and fine aggregates	2,220	8,560	3.87
Other construction materials	7	35	5.00
Agricultural limestone	75	633	8.44
Chemical and metallurgical:			
Cement manufacture	W	W	2.10
Lime manufacture	W	W	3.75
Flux stone	1,720	7,030	4.08
Sulfur oxide removal	W	W	3.91
Special, other fillers or extenders	26	153	5.88
Unspecified: ²			
Reported	17,400	66,100	3.79
Estimated	2,900	10,000	3.42
Total or average	43,200	160,000	3.71

W Withheld to avoid disclosing company proprietary data; included in "Grand total."

¹Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

²Reported and estimated production without a breakdown by end use.

TABLE 4
MICHIGAN: CRUSHED STONE SOLD OR USED BY PRODUCERS IN 2001, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3	
	Quantity	Value	Quantity	Value	Quantity	Value
Construction:						
Coarse aggregate (+1 1/2 inch) ²	--	--	W	W	W	W
Coarse aggregate, graded ³	2,810	11,600	W	W	W	W
Fine aggregate (-3/8 inch) ⁴	804	2,870	W	W	W	W
Coarse and fine aggregate ⁵	100	352	1,530	6,100	1,920	8,440
Other construction materials	--	--	7	35	--	--
Agricultural ⁶	--	--	3	22	72	611
Chemical and metallurgical ⁷	2,860	10,600	8,800	24,600	--	--
Special ⁸	--	--	26	153	(9)	(9)
Unspecified:¹⁰						
Reported	3,000	11,200	7,760	29,100	6,660	25,800
Estimated	760	2,600	730	2,500	1,400	5,000
Total	10,300	39,200	21,600	74,100	11,300	46,900

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes filter stone, riprap and jetty stone, and other coarse aggregates.

³Includes bituminous aggregate (coarse), bituminous surface-treatment aggregate, railroad ballast, and other coarse aggregates.

⁴Includes stone sand (concrete), stone sand bituminous mix or seal, screening (undesignated), and other fine aggregates.

⁵Includes crusher run (select material or fill), graded road base or subbase, unpaved road surfacing, and other coarse and fine aggregates.

⁶Includes agricultural limestone.

⁷Includes cement manufacture, flux stone, lime manufacture, and sulfur oxide removal.

⁸Includes other fillers or extenders.

⁹Less than 1/2 unit.

¹⁰Reported and estimated production without a breakdown by end use.

TABLE 5

MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2001, BY MAJOR USE CATEGORY¹

Use	Quantity		
	(thousand metric tons)	Value (thousands)	Unit value
Concrete aggregates (including concrete sand)	9,900	\$38,800	\$3.92
Plaster and gunitite sands	41	327	7.98
Concrete products (blocks, bricks, pipe, decorative, etc.)	571	2,690	4.70
Asphaltic concrete aggregates and other bituminous mixtures	2,820	11,400	4.03
Road base and coverings	9,820	32,100	3.27
Road stabilization (cement and lime)	371	1,420	3.84
Fill	8,860	17,600	1.98
Snow and ice control	484	1,520	3.13
Other miscellaneous uses ²	587	2,950	5.02
Unspecified: ³			
Reported	21,000	80,400	3.83
Estimated	22,000	77,000	3.53
Total or average	76,300	266,000	3.49

¹Data are rounded to no more than three significant digits, except unit value; may not add to totals shown.

²Includes filtration and railroad ballast.

³Reported and estimated production without a breakdown by end use.

TABLE 6
MICHIGAN: CONSTRUCTION SAND AND GRAVEL SOLD OR USED IN 2001, BY USE AND DISTRICT¹

(Thousand metric tons and thousand dollars)

Use	District 1		District 2		District 3		Unspecified districts	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Concrete aggregates (including concrete sand)	172	1,220	1,020	3,870	8,710	33,700	--	--
Concrete products (blocks, bricks, pipe, decorative, etc.) ²	W	W	W	W	516	2,510	--	--
Asphaltic concrete aggregates and other bituminous mixture	206	753	659	2,550	1,790	7,590	171	473
Road base and coverings ³	554	1,510	1,970	5,840	7,110	24,600	553	1,530
Fill	450	570	692	1,050	7,720	16,000	--	--
Snow and ice control	25	59	193	409	265	1,050	--	--
Other miscellaneous uses ⁴	32	119	222	1,330	429	2,010	--	--
Unspecified: ⁵								
Reported	62	110	420	1,420	20,500	78,900	6	10
Estimated	1,770	6,690	3,490	12,600	16,600	57,700	--	--
Total or average	3,270	11,000	8,660	29,100	63,600	224,000	731	2,010

W Withheld to avoid disclosing company proprietary data; included in "Total." -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes plaster and gunite sands.

³Includes road and other stabilization (cement and lime).

⁴Includes filtration and railroad ballast.

⁵Reported and estimated production without a breakdown by end use.